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ABSTRACT

A wide diversity of interesting plant and animal life can be observed and studied at Mingo National Wildlife Refuge, the last sizeable example of the swampland which once covered millions of acres in the area. Many of the species here, such as the swamp rabbit, are rare elsewhere in the state. The refuge's archaeological and historical resources are equally diverse. Mingo's original purpose was to provide a resting and wintering area for waterfowl. Today educational experiences are also provided on the refuge. School groups are offered two types of activities--self-guided tours and planned field activities. For the tours, refuge personnel provide a short orientation talk to the class and go over the route to be taken with the teacher. For the planned field activities, lesson plans are provided. Refuge staff will sometimes be able to assist in conducting these activities. This handbook includes examples of the lesson plans. Topics covered are: observation and perception, habitat investigation (energy cycle), basic measuring, rural life and the Depression, compass use, contour mapping, creative writing and nature, art and nature, cemetery study, land use study (pioneer homestead), aquatic biology, transect study, soils and erosion, observing and classifying trees, and creative communication using nature as a stimulus. (NQ)

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MINGO NATIONAL WILDLIFE REFUGE

Environmental Education Program

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TEACHER'S HANDBOOK

R0049509

MINGO REFUGE

Last year over 130,000 people visited Mingo National Wildlife Refuge. Some came to hunt or fish, but many came because of the outstanding educational opportunities the refuge offers. Mingo is the last sizable example of the swampland which once covered millions of acres in this area, and a wide diversity of interesting plant and animal life can be observed and studied. Many of the species here, such as the swamp rabbit, are rare elsewhere in the state. The refuge's archaeological and historical resources are equally diverse. Although the original purpose of the refuge was to provide a resting and wintering area for waterfowl, today preservation of this unique ecosystem and providing educational experiences on the refuge are also important purposes.

What is Environmental Education? Environmental education is not a separate subject area, but a non-diciplinary method of teaching basic classroom curriculum. The rationale for E.E. is that kids learn best by experiencing real objects and real situations, both in and out of the classroom. Planned learning activities at areas such as Mingo Refuge, or on the school grounds, can provide new motivation, increase the relevancy of what is learned, stimulat self-exploration, and help to develop a new environmental ethic more in harmony with the needs of today. Biology and other sciences are logically important components of most E.E. programs; however, education in history, art, math, and language arts can profit dramatically from the use of direct field experience.

Lesson Plans and Curriculum Development. At Mingo lesson plans in a varie of subject areas and grade levels have been prepared to provide ideas for teach interested in developing an E.E. program. These lesson plans are listed in the appendix, and single copies are free. Refuge personnel are glad to work with interested teachers to develop additional lesson plans or to initiate a comprehensive E.E. program for their school.

Where to go for Field Activities. Most communities have a wide variety of areas suitable for E.E. activities--parks, cemeteries, etc. Many activities can be done right on the school grounds. Because of the logistics involved, a sustained, dynamic E.E. program requires maximum use of resources near at hand. Several times during the school year however, trips to uniquely interesting areas such as Mingo Refuge might be included in the program.

Trips to Mingo Refuge.

School groups come to the refuge for two main types of activities--self-guided tours, and planned field activities. For the tours, refuge personnel provide a short orientation talk to the class and go over the route to be taken with the teacher. A leaflet is provided which explains points of interest along the route. Staff members usually do not accompany the bus.

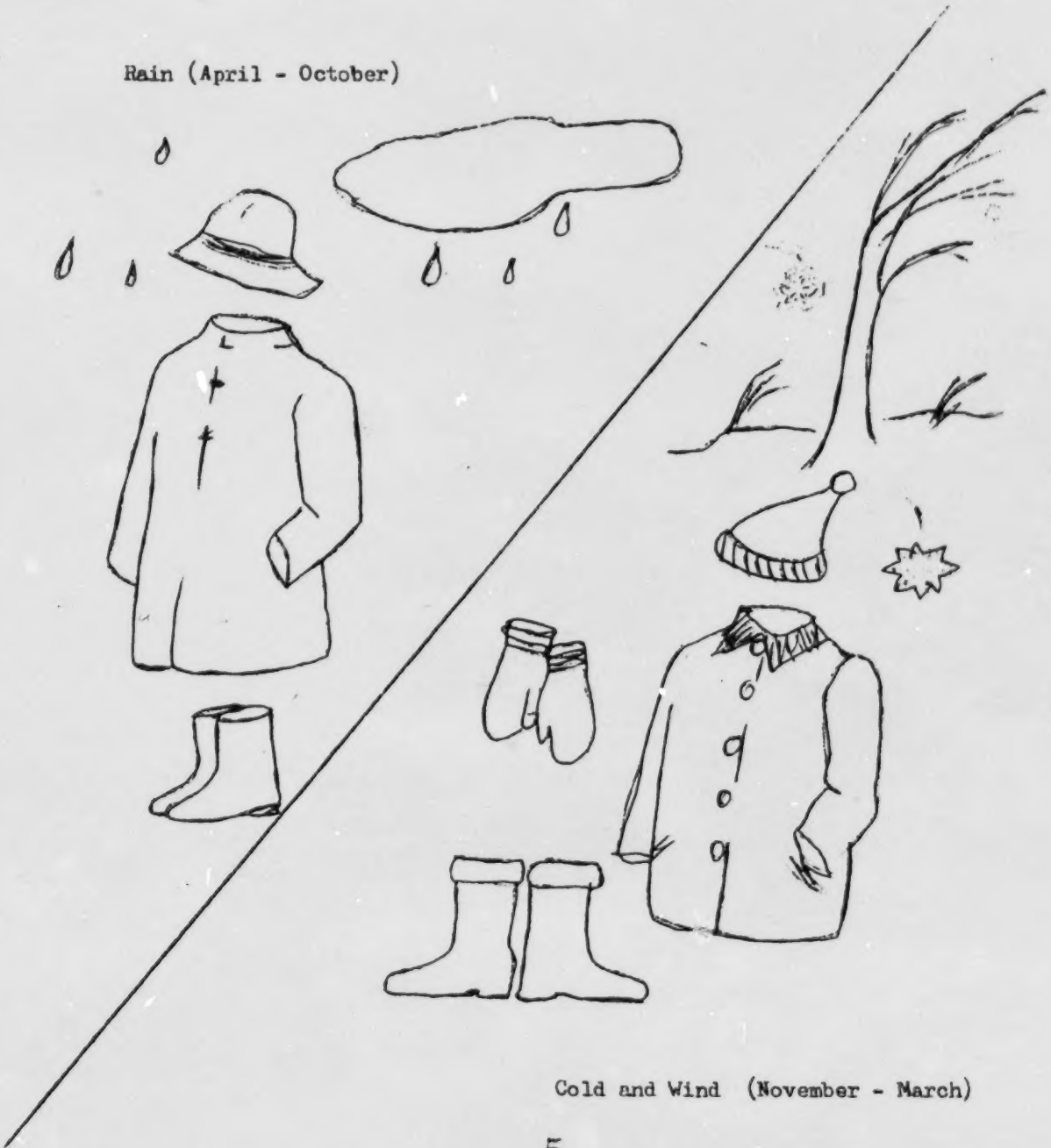
Many teachers, however, find planned field activities such as the example lesson plans provided, more worthwhile than the general tour. Refuge staff will sometimes be able to assist in conducting these activities. Because of the need to work in small groups, it is difficult to accomodate more than one class at a time unless additional teachers come along to assist. As a safety measure, classes should have one adult (parent aide etc.) for every 10 students, and for both types of activities, the TEACHERS ARE RESPONSIBLE FOR THE DISCIPLINE AND CONDUCT OF THE GROUPS AT ALL TIMES!!

When to Come and What to Wear. Mild winters permit E.E. activities on the refuge throughout the year if the students are dressed appropriately. However, scheduling of trips to the refuge in late May and June should be avoided, since the refuge staff is particularily busy then. Always be prepared to stay both warm and dry, and have the students and adults wear old clothes for field activities. Scheduling flexibility is a must to capitalize on good weather.

Facilities. A lunch will be necessary if the trip is planned for the entire day. Rest rooms are provided at the picnic areas, and water is available at refuge headquarters.

If You Come To Mango, Here's What You Will Need:

PROPER CLOTHING for <u>both</u> students and teachers



APPENDIX

Typical Field Trip Schedule

List of Lesson Plans

Sample Lesson Plans

For additional information on materials and programs, contact:

Refuge Manager
Mingo National Wildlife Refuge
Route 1, Box 9-A
Puxico, Missouri 63960

Typical Field Trip Schedule

9:00 - 10:30	Arrive at Refuge Do lesson: Plan #2 - Habitat Investigation
10:30 - 11:30	Art and Language Art activities from lesson plan 16
11:30 - 12:00	Lunch
12:00 - 2:00	Construct topographic map of archaeology site- Lesson Plan #6
2:00	Return to School

MINGO LESSON PLANS
(Copies available upon request)

1. Observation and Perception
2. Habitat Investigation - Energy Cycle (Included in this handbook)
3. Basic Measuring
4. Rural Life and the Depression
5. Compass Use
6. Contour Mapping (Included in this handbook)
7. Creative Writing and Nature
8. Art and Nature
9. Cemetery Study
10. Land Use Study - Pioneer Homestead
11. Aquatic Biology
12. Transect Study
13. What is a Tree?
14. Soils and Erosion
15. Observing and Classifying Trees
16. Creative Communication using Nature as a stimulus (included)

MINGO LESSON PLAN 2
Habitat Investigation - Energy Cycle

Subject Area: Biology

Grade Level: Sixth

Purpose: 1. To familiarize students with the variety of organisms that can be found in most habitats. 2. To have the students develop the ideas of interrelationships and energy flow in an ecosystem.

Equipment: Clipboards, Pencils, Activity Sheets (hand lenses, collecting equipment optional)

Previsit Activity: Classroom discussion on the types of plants and animals that might be encountered on the field trip will be helpful as will a discussion of the basic requirements for life all organisms share. If a unit on general natural history identification (trees, flowers, etc.) is scheduled for the school year, this field activity works well to reinforce such a unit.

The Site: This lesson plan is designed for use at Mingo's E.E. site, but will work equally well in any area of natural cover.

Field Activity: Several activities from Mingo Lesson Plan # 1 should be used to set the mood for the following work.

1. Set the stage by assembling the students and briefly outlining the activity, eg., in the next hour and ½ we are going to take a close look at this area to find out what plants and animals live here and investigate the relationships these plants and animals have to each other.

2. Pose a series of questions similar to the following:

   A. What animals would we expect to find living here? Make sure that insects and other inverts are prominantly mentioned.

   B. What are the basic needs of some of these animals?

   C. What are names of places where animals live (homes, environments, habitats)?

   D. What specific places would you look for animals here - stumps, logs, rocks, in puddles, ditches, etc.?

3. Divide group in half
   Assign Areas
   Pass out equipment
   Pass out Activity Sheet A
   Set rendezvous time.

   Conduct
   ACTIVITY A

4. Reassemble group and ask following series of questions.

   A. What animals (& evidence of animals) did you find in each area?

   B. Why did some places you investigated (habitats) have more animals than others?

   Conduct
   ACTIVITY B

5. After activity pose following questions and discuss:

   A. What is the role or function of each part of the energy cycle?

   B. What would happen if one group were removed from the cycle? Pose several specific examples.

   C. Briefly discuss the idea of a food chain. (Activity C can be used to lengthen the field work, or used as a post activity follow-up.)

6. Lead the students into a review and wrap up.

   A. What did we find out about animals in our investigation (Different animals, different habitat requirements, etc

   B. Why are plants important in the ecosystem? Animals?

   C. How can we summarize our investigations today? (Have the students generally describe and recapitulate the day's activities).

Follow Up: Activities C and D are designed as post-activity discussions for the trip home or after returning to school, but may be used to stretch the length of the field activity.

The 4 activities below are designed to be mimeographed, on separate sheets, and passed out for the students to complete as indicated in the lesson plan.

ACTIVITY A

Explore your area carefully, and record animals that you see or any evidence of animals. As you inventory the animals or their evidences, figure out some way of recording amounts of evidences and animals seen.

1. Look for and list animals seen (mammals, insects, snakes, frogs, birds).
2. Look for and list evidence (signs) of animals (tracks, homes, nests, feathers half eaten food, etc.)
3. Observe and list different habitats for wildlife in the area.
4. Observe and list animal foods in the area.

ACTIVITY B

Write the animals or animal evidences you have seen in the appropriate places in this diagram. Put in arrows to show the direction of the cycle.

Light
&
Nutrients

Plants

_____

_____

_____

Reducers (decomposers)

_____

_____

_____

Herbivores

_____

_____

_____

Carnivores

_____

_____

_____

ACTIVITY C

1. Construct a 5-stage food chain using specific plants and animals you've seen today.
2. Construct a 4 stage food chain with you as the animal at the end of the chain

ACTIVITY D

1. What are some of the things that man has done to affect the workings of the energy cycle?

2. Write down three things you can do in your everyday life to make the energy cycle more efficient and cause the least amount of harm to the environment?

3. Select the one you think would be your best contribution. Describe the benefits of this action ---

   A. Where you live

   B. As you and your family buy things

LESSON PLAN #6
Contour Mapping

Grade Level: 6th

Purpose: To introduce the students to the skills needed to construct and understand a contour (topographical) map. The students will actually obtain the data for constructing a contour map using a compass, sighting level, and measuring tape. The field work may also be used as a basis for a larger unit on types and uses of maps.

Equipment Needed: One compass per three students, sighting devices or levels (homemade), range poles and 50 foot tapes or ropes (also home made see equipment list). Clipboard, pencil, and paper per group of three. Large sheet of cardboard and paper for actually constructing maps back in the classroom.

Previsit Activities: 1. A classroom review of the parts of a compass and how it works. This could be done in connection with Mingo Lesson Plan #5 so that the students are able to use a compass in the field. 2. Examination of several different types of maps.

Site Selection: This activity calls for the students to run parallel lines up or down a hillside and measure changes in elevation along these lines. A series of starting points (one for each line) will need to be laid out in advance or could be laid out by the students.

Any site can be used that has a moderate but not too regular change in elevation. (A grassy hillside with small valleys or gullys is ideal.) The easiest site to use would be a moderately sloped hill with about 100 feet of level ground along the top or bottom. (The edge of a ballfield, playground, sidewalk, or road might be used.) Such a site would allow you to plot the starting points in a straight line and at about the same level. This makes it much easier to actually draw the map.

Sites that don't allow you to layout the starting points in a straight line and/ or at the same level can, of course, also be used; but additional computations and field measurements must be done before the map is drawn.

Hartz Pond: The site for which this lesson Plan has been written is the Hartz Pond E.E. site on Mingo National Wildlife Refuge. From USGS topographic maps of the area, the students can infer that the Pond is at an elevation of 410 ft. The north edge of the pond has 10 numpered stakes along it which will be used as the starting points. These stakes are at 10 foot intervals, and since they are all at the water's edge they are all at 410 ft. elevation. (It is not really necessary to know the actual elevation of the starting points. Since the points are all at the

same level they could be artitrarily called 0 elevation and changes recorded as relative measurements-- 2 feet higher than the starting point, 4 feet lower, etc.) Although the points are at the same level they are not in a straight line and as will be shown later, special measurements need to be made to enable you to plot the points correctly on your map.

Procedure: 1. At the site assemble the class at the pond's edge and pose the following problem: Where would the shore line of this pond be if we raised the water level four feet? ten feet? Encourage the students to discuss ways to solve this problem as time allows. Then explain how a fairly precise topographic map of the area can be constructed that would show the solution to this problem.

Explain to the students that for the mapping we need a starting point (the pond's edge); a method of determining changes in elevation (the sighting level and range pole); something to measure linear distance (measuring tape or marked rope); and a system that allows us to accurately record the data and systematically use it to draw a topographic map (for this exercise we use a system of parallel lines up a hill and the students find the elevations along these lines from a known starting point.) See Illustrations.

2. Collecting the data: Start by dividing the class into groups of five or six. Explain how the sighting level and range pole are used. To set up the system of parallel lines the students will be following, you can have the class actually lay the lines out using a string and compass, or better yet make sure that the class is well enough versed in the use of the compass that the string can be omitted and just the compass used to keep the students on an imaginary line up the hill. A line will be run from each starting stake, and since at the Hartz Pond ten stakes are used ten lines will need to be run (due north by the compass). At this site ten lines ten feet apart and 100 feet long work well, but at other sites other measurements will probably need to be used.

After the lines (real or imaginary) have been laid out or discussed, the students then use the sighting levels, range poles, and measuring tapes to record the horizontal distance between two foot intervals of elevation along the lines. (see illustrations) Each group of students should run at least two lines. A different data sheet should be used for each line.

Two special problems need to be mentioned here. First, the initial measurement at the pond's edge will have to be taken backwards i.e. with the range pole at the water's edge rather than the sighting level being there. Otherwise, the person doing the sighting will be standing in water. Second, a way needs to be found to accurately depict the shoreline of the pond and the location of the numbered stakes. If this is not done there will be no way to recreate them to actually start drawing the map. The easiest way to arrive at a true shoreline is to lay out a line at right angles to the lines running up the hill (in this case it would be east-west). The line should be as close to the pond's edge as you can get it. From this line you can then find the horizontal distance back down the hill to each stake at the water's

edge. These field measurements can then be used to plot the shoreline and stake location when you draw the map.

A third problem will be encountered on sites where the starting stakes are not all at the same elevation. To correct for this, choose the starting point of one of the lines as an arbitrary 0 reference and using the sighting level find a point on each of the other lines that is either at the same elevation or at a multiple of two feet relative to this point. Mark this point on each line and use it as the starting point for further measurements. To reconstruct these new starting points when you draw the map, use the technique described earlier for locating the ponds edge. If you actually know the elevation of some point on your hillside, use this point instead of an arbitrary 0 reference.

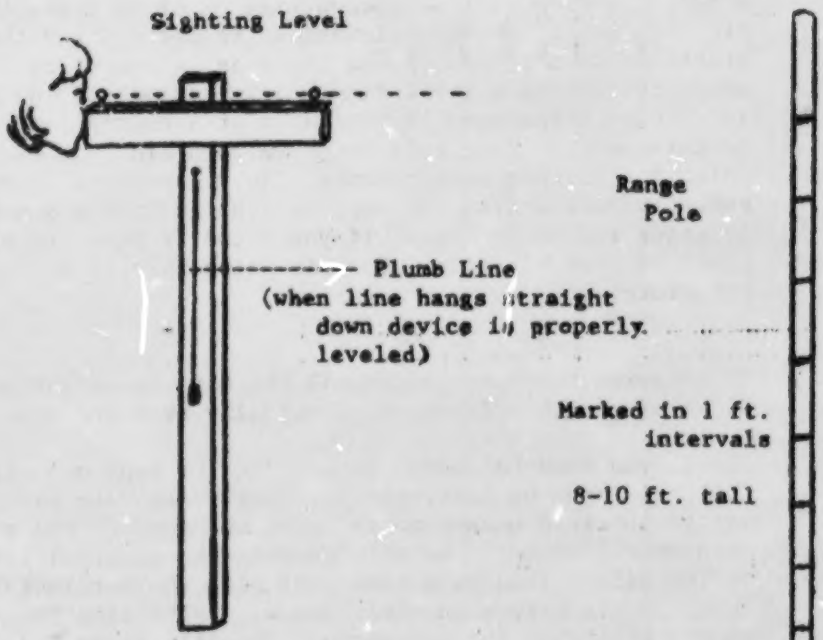
3. Drawing the map. After all the data is collected, you may want to return to the classroom to actually draw the map.

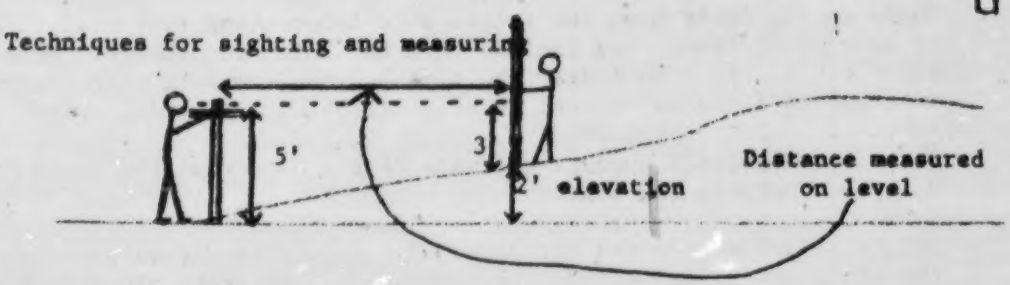
First, you need to decide on a scale for your map (depending on paper size, distance up hill, etc.). Next, draw your east -west line and using the field measurements, plot the edge of the pond and location of numbered stakes. Lightly draw in the parallel lines you laid out up the hill. Then have each grop plot the horizontal distance between two foot elevations on their lines. Connecting the rows of plotted points will show the contours of the hillside mapped.

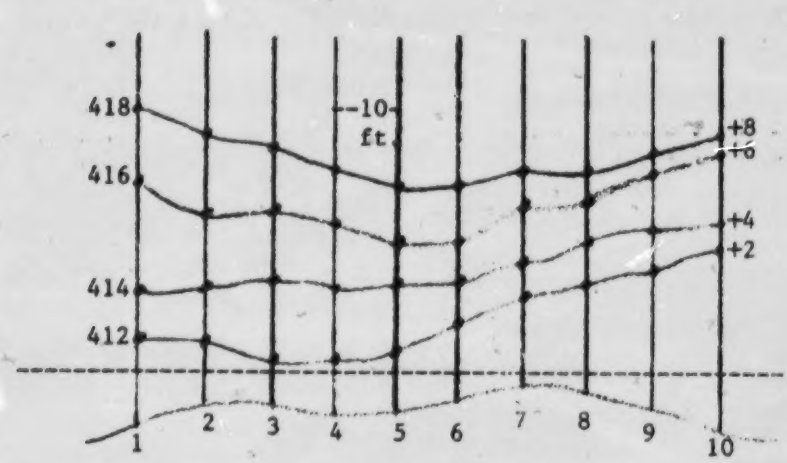
Follow Up: While in the field have the groups note interesting features along or near their lines, and include them on their data sheets. When the class returns to school draw the finished map complete with contours, interesting features, legend, scale, title, and N/S orientation.

Show the class USGS topographic maps of the area that the class mapped. Have them compare the maps.

Make a relief map of the hillside. Put pieces of carbon paper under the class's map, and trace each contour on a separate piece of ¼" thick cardboard. Cut along the contour for each piece of cardboard, glue the layers together, and you have a relief model of the refuge hillside.







Dots represent 2' changes in elevation along each parallel line. Connecting the dots shows the contours.

East/West line used to reconstruct pond's edge

Pond at 410 ft. elevation

MINGO LESSON PLAN 16

Creative Communication Using Nature
As a Stimulus

Subject Area: Art and Language Arts

Grade Level: Elementary

Purpose: To use nature as a stimulus for student art and language art activities. To explore art and language arts as a means of communication.

Equipment: The following equipment will be needed for the series of activities:

Activity 3: Rubbings -- heavy rice paper (heavy manilla paper will work) one sheet per student. Large crayons-½ per person.
Activity 5: Role playing -- pencil and paper for each student.
Activity 6: Charcoal Art-- Charcoal and drawing paper, one piece per person. Charcoal can frequently be found on the site, if not build a fire and let it burn out beforehand.
Activity 8 -- Concrete Poetry -- pencils, paper, examples sheet.
Activity 9: Collage -- construction paper, glue

Activities: The following series of activities is an example of how art and language art exercises (See Mingo Lesson Plan 1, 7, and 8) can be combined for a 2 hour field activity. The number of activities and their arrangement can be changed to fit the time and interest of the group involved.

Procedure

Ask students: What is communications? Why communicate at all? Try to draw out answers such as to work together; to express emotion; to express opinion; etc. Ask: How can and do we communicate? Draw out answers such as by pictures; by drawings, writing, etc.

Activity 1

Beautiful vs Ugly. Send the students out to find one thing that is ugly and one thing that is beautiful. Have each one tell the rest of the class why they think the way they do. Point the differences in opinion. Ask: Is one opinion wrong? Why do differences exist?

Activity 2

Observing a twig. Have the group form a circle and pass around a small twig. Have each person make a new factual observation about the twig as it is passed to him. See how many different observations the group can come up with.. Encourage use of all senses. Have the group discuss what good observation has to do with communication.

Activity 3

Point out that the sense of touch is one frequently neglected or ignored. Have the students spend a couple of minutes touching different surfaces; rocks, soil, Ask: How can one communicate texture?

Rubbings: Pass out materials; rice paper and large crayons. Have students choose a surface. (rock, tree etc.) place paper on surface, and rub entire sheet with the length of the crayon. This will "capture" the texture of the subject.

Activity 4

Point out that the last two activities have dealt with factual communication, and that the next activity will add another dimension.

Wishful thinking: Have the students consider for a few minutes what object, plant or animal of the area they would wish to be if they could. Have each name his choice and tell why. Move right into activity 5.

Activity 5

Role playing: Have each student write a history of the area as seen through the eyes of the object he picked for activity 4. The students can take either a factual approach or a highly imaginative one. Have several read their compositions. Discuss what elements -imagination, idividu alism, have added to this communication.

Activity 6

Charcoal Art: Find a distinctive figure or feature in the area (stump, tree, stag) Arrange the group around it and have them sketch the object using charcoal (see equipment). Encourage creativity rather than expect reproductions. Share the drawings with the group when completed.

Activity 7

Tell the group that next we are going to add words to the art.

Cinquain. Have the students write the following on their drawing:

Write 2 descriptive words about the stump (what it looks like)
Write 3 action words about the stump (things happening to it - changes)
Write a short phrase (4-5 words) that tells how the stump effects the rest of the environment (its value or usefulness or any thought you have about the stump)
Write one word that sums up everything about the stump (a word that suggests a comparison, an analogy, or synonym)

Now if you wish to go back and give a title to what you have written, you may. Congratulations! You have just written a poem in a form called cinquain. Discuss how the poem and drawing together make a more forceful form of communication than either separately.

Activity 8

Concrete poetry: Tell the group that concrete poetry goes one step further to actually combine words with pictures, graphs or linear art forms. It is free verse, no rhyme or meter and can take one of three forms: visual, story, or factual. As the example sheet shows it's a particularly fun combination of art and poetry.
Give each student an example sheet. Go over each type, answering questions. Then have them compose their own examples of each form. Share results.

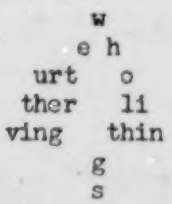
After the last exercise is completed, ask one of the students to sum up the field work. Ask them their opinion and feelings about art and poetry, and whether they think it is an important form of communication. Discuss why or why not.

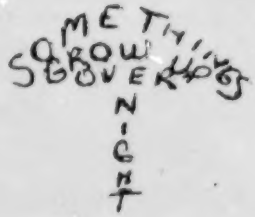
Activity 9

Collage: Before returning to the classroom, have the students gather objects of different colors, shapes, textures, etc. Return to the classroom and have the students glue materials on to heavy construction paper to form a collage.

CONCRETE POETRY- Examples

Type 1--Visual: Words arranged in picture form.





Type 2: Story: The words make a statement, and their arrangement completes the action and reveals an ending.

I tOUCHed
a bUG.

I sneaked up on a

f^ro^g.

Type 3-- Factual: Expression of idea, fact or image by use of the spatial relationship between words.

WATER		OIL		"LIFE"	"DEATH"
fish	swim	ground	COW		
		OIL		ME	Grass
				Grass	Ground
				Ground	ME

HAIKU AND CINQUAIN POETRY

Characteristics of Authentic Haiku:

Haiku is a three line verse form which originated in 13th century Japan.

Three lines: Line one contains 5 syllables; Line two contains 7 syllables; Line three contains 5 syllables.

English translations do not always follow the above pattern. Each poem includes the season, location, refererence to nature. No subject matter deals with simple ordinary things. No rhyme. (Japanese words end in vowels or "N" sounds) Few articles or pronouns - syllables can be used for better purposes. Thought comes first; then the syllables are adjusted to fit the form.

Some Student Expressions

Mother Tree
Stretching out her arms
To protect the world from the
Fury of the skies.

Sadness
The dying of the flowers,
The turning of the grass,
The autum breeze.

Characteristics of Cinquain Poetry;

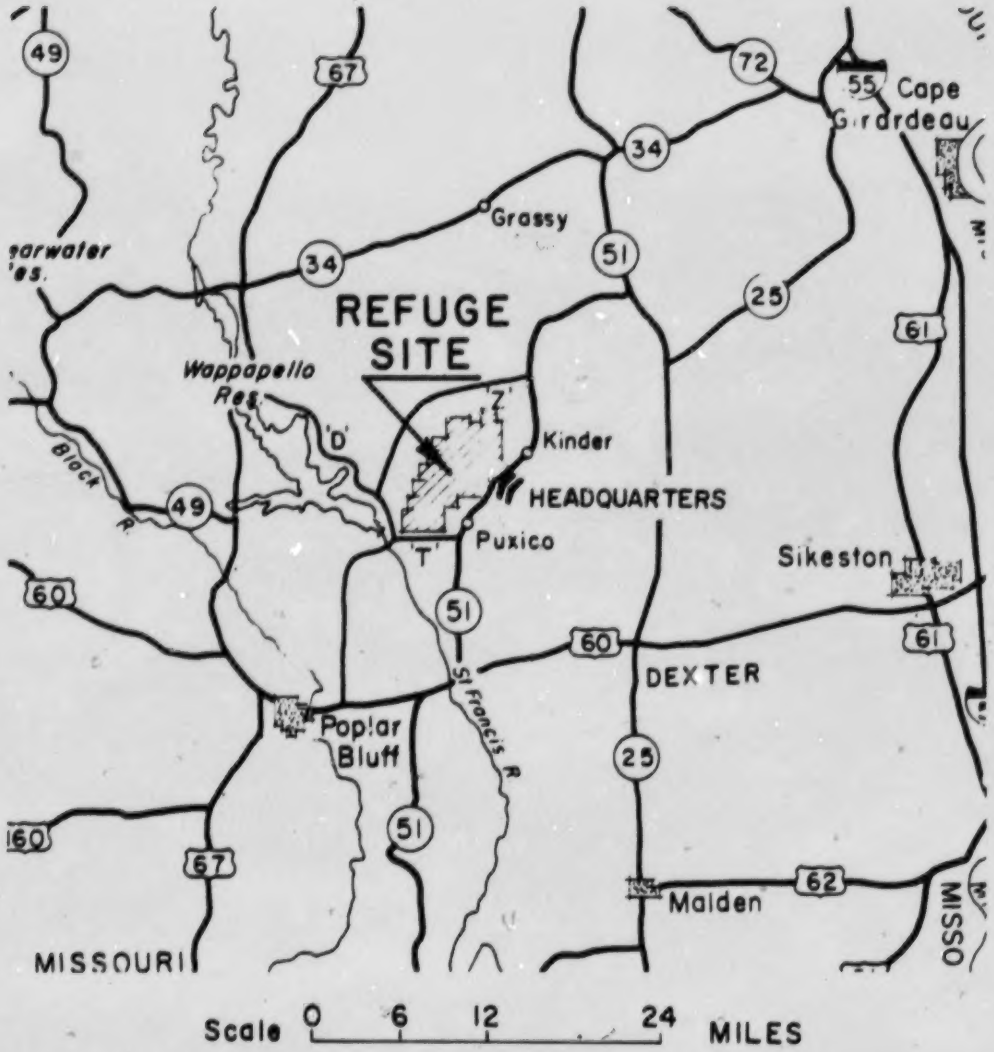
A five line, non rhyming poem with the pattern of 2,4,6,8,2 words or syllables per line. (See activity 7 for detailed instructions on writing cinquains.)

Some student Expressions

River
Rushing beauty
Carving future legends
Sharing only blissful moments
God send

The wind
Moans through the oaks
Barren trees of winter
But the threads of life are retained
Acorns!

REFUGE location & address



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

MINGO NATIONAL WILDLIFE REFUGE

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Mingo Lesson Plan # 1

Observation and Perception

Subject Area: Science

Grade Level: All elementary grades

Purpose: To heighten student's observational ability, perception, and awareness of the natural world. This unit serves as a general introduction and orientation to field work for the students. It sets the mood and teaches basic observational skills necessary for many of the lesson plans developed for use at Mingo Refuge.

Equipment: One quadrat sheet for every four students (a square of cloth or plastic with a one foot diameter hole in the center) pencil, paper, clipboard for each group.

Procedure: The order and number of the following activities can be changed as time and planned subsequent activities dictate.

1. Observing a twig. Pick a small branch or leaf, and pass it around the group. Each person should make a single factual observation about the object. By looking closely, the group should be able to discover 20 to 30 different features. Be sure to include touch and smell in addition to visual observation. Discuss how many people look at an object without actually seeing it.

2. Find your own. Have each student pick up a small stone or twig. Each student should study his own carefully. Form the group into a circle, and have the students pass the objects around the circle behind their backs. Do this for several minutes and then tell the students to keep their own when it reaches them. Keep passing the object until everyone has one, then look and see if the students have identified their object. (For larger groups you may have to tag the object with student's name.)

Discuss how we depend heavily on our sense of sight, and emphasize how the use of all our senses can provide much more information.

3. Touch and Smells. Send the students out to bring three objects of different textures, and three objects with different smells.

Discuss the use of different senses as in number 2.

4. Quadrat Study. Divide the class into groups of four or five and pass out the quadrat sheets. Tell the groups to spread out and pick a spot for their sheet. Have each group record how many different things they find in their circle. Emphasize careful observation and recording of detail. After about five minutes call the group together and discuss the variety and number of things found in the small space being examined.

5. Ugly or Beautiful. Send the members of your class out into the woods and have them bring back one thing that is beautiful and one thing that is ugly.

After the class is reassembled, have each member tell what he found, and why he thinks the objects are beautiful or ugly. Make the point that the terms beautiful or ugly are subjective terms as compared to the relatively objective descriptions the class has been making in previous exercises.

6. Sounds of Silence. This activity is a good one to use at the end of a field activity or between two activities. It quiets the class and establishes the mood for further work.

Simply have the class sit down where they are at and close their eyes. For a period of two minutes, have them remain quiet and count the number of different things they hear. After two minutes discuss the number and types of sounds heard.

MINGO LESSON PLAN 2
Habitat Investigation - Energy Cycle

Subject Area: Biology

Grade Level: Sixth

Purpose: 1. To familiarize students with the variety of organisms that can be found in most habitats. 2. To have the students develop the ideas of interrelationships and energy flow in an ecosystem.

Equipment: Clipboards, Pencils, Activity Sheets (hand lenses, collecting equipment optional)

Previsit Activity: Classroom discussion on the types of plants and animals that might be encountered on the field trip will be helpful as will a discussion of the basic requirements for life all organisms share. If a unit on general natural history identification (trees, flowers, etc.) is scheduled for the school year, this field activity works well to reinforce such a unit.

The Site: This lesson plan is designed for use at Mingo's E.E. site, but will work equally well in any area of natural cover.

Field Activity: Several activities from Mingo Lesson Plan # 1 should be used to set the mood for the following work.

1. Set the stage by assembling the students and briefly outlining the activity, eg., in the next hour and ½ we are going to take a close look at this area to find out what plants and animals live here and investigate the relationships these plants and animals have to each other.

2. Pose a series of questions similar to the following:

   A. What animals would we expect to find living here? Make sure that insects and other inverts are prominantly mentioned.

   B. What are the basic needs of some of these animals?

   C. What are names of places where animals live (homes, environments, habitats)?

   D. What specific places would you look for animals here - stumps, logs, rocks, in puddles, ditches, etc.?

3. Divide group in half
   Assign Areas
   Pass out equipment
   Pass out Activity Sheet A
   Set rendezvous time.

   Conduct
   ACTIVITY A

4. Reassemble group and ask following series of questions.

   A. What animals (& evidence of animals) did you find in each area?

   B. Why did some places you investigated (habitats) have more animals than others?

   Conduct
   ACTIVITY B

5. After activity pose following questions and discuss:

   A. What is the role or function of each part of the energy cycle?

   B. What would happen if one group were removed from the cycle? Pose several specific examples.

   C. Briefly discuss the idea of a food chain. (Activity C can be used to lengthen the field work, or used as a post activity follow-up.)

6. Lead the students into a review and wrap up.

   A. What did we find out about animals in our investigation? (Different animals, different habitat requirements, etc.

   B. Why are plants important in the ecosystem? Animals?

   C. How can we summarize our investigations today? (Have the students generally describe and recapitulate the day's activities).

Follow Up: Activities C and D are designed as post-activity discussions for the trip home or after returning to school, but may be used to stretch the length of the field activity.

The 4 activities below are designed to be mimeographed, on separate sheets, and passed out for the students to complete as indicated in the lesson plan.

ACTIVITY A

Explore your area carefully, and record animals that you see or any evidence of animals. As you inventory the animals or their evidences, figure out some way of recording amounts of evidences and animals seen.

1. Look for and list animals seen (mammals, insects, snakes, frogs, birds).
2. Look for and list evidence (signs) of animals (tracks, homes, nests, feathers half eaten food, etc.)
3. Observe and list different habitats for wildlife in the area.
4. Observe and list animal foods in the area.

ACTIVITY B

Write the animals or animal evidences you have seen in the appropriate places in this diagram. Put in arrows to show the direction of the cycle.

Light
&
Nutrients

Plants

_____

_____

_____

Reducers (decomposers)

_____

_____

_____

Herbivores

_____

_____

_____

Carnivores

_____

_____

_____

ACTIVITY C

1. Construct a 5-stage food chain using specific plants and animals you've seen today.
2. Construct a 4-stage food chain with <u>you</u> as the animal at the end of the chain.

ACTIVITY D

1. What are some of the things that man has done to affect the workings of the energy cycle?

2. Write down three things you can do in your everyday life to make the energy cycle more efficient and cause the least amount of harm to the environment?

3. Select the one you think would be your best contribution. Describe the benefits of this action ---

   A. Where you live

   B. As you and your family buy things

MINGO LESSON PLAN #3
MEASURING AND ESTIMATION

Subject Area: Math - Measuring and Estimation

Grade Level: 4th

Purpose: The primary purpose is to demonstrate the necessity of a standard system of measurements for communicating concepts of size and distance. The importance of accurate measurements can also be discussed.

A secondary purpose is to give experience to the student in accurately estimating large numbers.

The unit could also be used as background for a discussion of the historical development of the English and metric systems of measurement.

Equipment: A 50 ft. tape, meter stick, yard stick, etc.

The Site: The activities are designed to be done on the school grounds, but they can easily be adapted for use in the school room.

The Activities: 1. Standard Measurements

Have several students of different heights pace off a distance of 50 paces. Discuss why the students did not all end up at the same point. Mention that the pace used to be a standard unit of measure, and discuss the difficulties that this must have caused. (selling and buying land, etc.)

Second, divide the class into four groups, and have each group lay out a course involving two distances and two directions (see Mingo Lesson Plan #5 for compass use). The object will be to write down directions so that another group can follow the written instructions, and retrace the course. The problem arises that each group must devise their own method for measuring the distances.

For instance, if one group uses paces, it is unlikely that another group will be able to retrace the course because of the differences in the length of the paces.

After the groups have exchanged instructions, and tried to follow the courses, assemble the groups and discuss why no-one ended up exactly at the intended destination.

Ask the groups to devise a method so that the distance would be more accurate. Lead the group into discovering that as with the first activity, a standard measurement is needed. (For this exercise, one group could have made the measurements in terms of an object such as a stick or shoe, and then passed the object to the other group with the instructions.)

Follow-up back in the classroom can explore the necessity of the world's having agreed on certain units as being standard, and the chaos that would result if there were no standards (use plenty of examples.).

2. Estimation of Numbers

Ask the students to guess how many leaves there are on a particular tree. Record the guesses. Next, ask several students to count the leaves. After a few minutes, the time consumption and inaccuracy of these procedures should become evident.

Next, estimate the number of leaves by counting the leaves on several different size branches. Then multiply the number of leaves in each size category by the number of branches in each size category for the total number of leaves on the tree. The relative speed and accuracy advantages should become apparent. The more categories of branch size involved, the greater the accuracy of the estimation. eg. Ten categories should provide much more accuracy than two. However, the extra catergories also require more time to count so a balance between speed and accuracy must be struck.

After the concept of estimating and measuring numbers of objects has been discussed by the class, assign individuals or small groups (depending upon class size) to find a million of something, and be able to offer proof supporting their find.

After a specified amount of time, have each group or individual explain his finds and the line of reasoning he used to arrive at his conclusion. Discuss each estimate.

LESSON PLAN 4
Sweet Cabin Investigation

Category: Social Studies - American History

Grade Level: Sixth

Concept: Electrification of rural America and improvements in transportation have made dramatic changes in everyday life in only one generation.

Purpose: To demonstrate by an on-site investigation how many rural Americans lived during the 1930's (depression). The information on life styles gained from the investigation will then be contrasted with today's way of life to point out some of the fundamental effects modern technology has had.

Background: The site to be investigated is the Roy Sweet cabin and homestead. The cabin was built around 1933 at the head end of a small valley on Mingo National Wildlife Refuge.

A two page history of this homestead and a map of the site are available for the teacher's use. Care should be taken that this information is used sparingly with the class. Much of the information contained in the history can be deduced by the students from the site itself.

Logistics: When transportation time is considered, the lesson as presented will take most of a full school day. A sack lunch and something to drink will be necessary. Time in the field can be shortened by using all or part of Activity Sheet Three as a post-visit follow-up back in the classroom.

Procedure: The investigation is designed to be done in three sections - exploration of the cabin, exploration of the general site, and implications and discussion of the evidence found. A pre-visit Activity Sheet is also included as a classroom introduction to this lesson.

For each section, the students will be given an Activity Sheet to fill out while doing the field work. (see attached sheets) A brief summary and review should be held after each sheet is completed, and before moving on to the next section. Important points to be brought out in the discussion are presented on the following pages, arranged to follow the numbered questions on the three activity sheets.

ACTIVITY SHEET ONE

Question 1: Emphasize that a lack of labor saving devices made for a lot of hard work for everyone around the house. (eg. chopping wood for cooking and heating) Also, the lack of lighting fixtures should lead to a discussion of how effective lighting has changed living patterns.

Question 2: Contrasted with today, people during the depression (and in rural America in general) had very few possessions.

ACTIVITY SHEET TWO

Question 1: Discuss how food was obtained, and how much work this meant for all of the family.

Question 2: Everyday conveniences such as tap water or refrigeration were not available to many people in 1933. The amount of work this meant for a family was enormous.

Question 3: Discuss difficulties of travel, and the restrictions this placed on social life, schooling, etc.

ACTIVITY SHEET THREE

Sheet three is a general summary sheet emphasizing the contrast between then and now. The necessity of doing many daily chores, the need to entertain oneself rather than watching TV or calling up a friend, and along with the general lack of material goods should all be contrasted with today's life style. Questions 4 and 5 can be explored in as much depth as desired, or used as a post-visit activity back in the classroom.

Question 3: The two technological developments that are the answer to this question are electrification and improvements in transportation. There are, of course, many other "correct" answers the students may come up with. These should be explored as time allows. The effect of the general economic depression in 1933 should not be overlooked.

The three activities below are designed to be mimeographed on separate sheets and passed out for the students to complete as indicated in the lesson plan.

ACTIVITY SHEET ONE

For each question below, write down the actual physical evidence you observe, and then briefly explain how you interpret it. What you don't find as you investigate the cabin may tell you more than what you do find.

1. How was the house heated in the winter? How was it lighted?

2. Two children and their parents lived here. Where did they sleep? Where did everybody store their posessions ?

ACTIVITY SHEET TWO

Explore the land around the cabin, and use the evidence you find (or don't find) to answer the questions below.

1. What evidence can you find that indicates how the people that lived in the cabin got their food?

2. Where did water for washing or cooking come from? How was food preserved?

3. How did these people travel to get supplies or visit friends?

ACTIVITY SHEET THREE

1. After seeing the actual site, what changes would you make in the "Typical Daily Schedule" you made up before you came?

2. Do you think living here in 1933 would have been boring? Do you think the people who lived here thought it was?

3. What two major inventions or technological developments do you think are most responsible for the change in life styles between then and now? List some of the results of these developments.

4. Do you think the way you live today is better than the way these people lived in 1933? In three sentences or more, explain why you think the way you do.

5. Do you think the way of life in 1933 was more or less harmful to the environment than today's life style? List three specific examples to support your answer.

MINGO LESSON PLAN # 5
Compass Use

Grade Level: 3rd- 6th

Subject: Science

Purpose:
1. To familarize the student with the history and mechanics of the compass.
2. To give the student practice in using the compass to follow a course.
3. To provide supportive material for units on magnetism and mapping.

Equipment: 1 compass for every 3 students, 100 foot tape or rope

Classroom Activity:

1. Start with the following problem-- "A train robber wants to bury his loot so that the posse can't find it. The posse is chasing him across the flat plains, and the only landmark around is one large tree. He doesn't want to bury it right under the tree because that would make it too easy to find. If he buries it within sight of the tree, what instructions would he have to give someone so that they could recover the loot?"

Through discussion with the class, solve the above problem, and emphasize the three things needed to locate anything in the world are:

a. reference or starting point
b. direction of travel
c. the distance to travel

2. Discuss the history and use of the compass
a. Vikings and early explorers
b. use today-- pilots, surveyors, ship navigators, hunters, etc.

3. Discuss why a compass works, and what it is good for
a. earths magnetism and compass needle
b. discuss the difference between knowing which direction is which, and knowing which direction you want to go.

4. Explain the mechanics of using the particular compasses that the class will be using to run the compass course. (use of a large model is recommended)

5. Refer back to the introductory problem, and begin a discussion of the need to know distances.

a. how do we measure distance? (yardstick, ruler, etc.)
b. concept of estimating distance
c. explain method of finding pace
d. emphasize difference between pace and foot

6. Explain the outside activity and how the compass course is set up Divide the class into groups and go outside.

Field Activity: For this exercise, a compass course needs to be set up on the school grounds. Actually the course will be made up of 4 or 5 courses so that the students can work in small groups, and try several different courses for practice. Each course should have different starting point for each, a variety of degree readings and distances, and a prominent end point.

1. Each group should be given a card for one of the courses, which tell the starting point, and the directions and distances.

2. Before beginning the course however, the students will need to determine their pace so that they can acturately estimate the distances. This is done by marking off a 100 ft. length on the ground. Each student should then walk this 100 ft. length, and count the number of steps it takes. The 100 ft. divided by the number of steps is the student's pace. (This exercise should be done several times, with the students walking in a normal manner. Most 6th graders will have a 2 foot or 2½ foot-5feet every second step- pace.)

3. Have the groups run the compass course. Each group should run several courses if time permits. You may want to make a contest out of it by seeing which group comes closest to the correct end point.

4. Return to the classroom for questions and discussion. (problems errors, etc.)

Follow up Activities: A variety of follow up activities are possible.

1. Obtain some large maps of the United States, and have the students orient the maps and plot (by direction and distance using the compass) a route for an airline between several major cities.

2. Discuss the difference between magnetic north and true north. When is this difference critical? Discuss the meaning of declination, agonic, isogonic, etc.

3. Pose the following problem for the class to solve: "A man on a hunting trip started out from camp one morning, walking due south. after 10 miles he turned west and walked another 10 miles. At this point he shot a bear, and carried the bear 10 miles due north back to the camp he had started from in the morning. What color was the bear?

Since the only place his camp could be from the directions given is the north pole, the bear must be white.

LESSON PLAN #6
Contour Mapping

Grade Level: 6th

Purpose: To introduce the students to the skills needed to construct and understand a contour (topographical) map. The students will actually obtain the data for constructing a contour map using a compass, sighting level, and measuring tape. The field work may also be used as a basis for a larger unit on types and uses of maps.

Equipment Needed: One compass per three students, sighting devices or levels (homemade), range poles and 50 foot tapes or ropes (also home made see equipment list). Clipboard, pencil, and paper per group of three. Large sheet of cardboard and paper for actually constructing maps back in the classroom.

Previsit Activities: 1. A classroom review of the parts of a compass and how it works. This could be done in connection with Mingo Lesson Plan #5 so that the students are able to use a compass in the field. 2. Examination of several different types of maps.

Site Selection: This activity calls for the students to run parallel lines up or down a hillside and measure changes in elevation along these lines. A series of starting points (one for each line) will need to be laid out in advance or could be laid out by the students.

Any site can be used that has a moderate but not too regular change in elevation. (A grassy hillside with small valleys or gullys is ideal.) The easiest site to use would be a moderately sloped hill with about 100 feet of level ground along the top or bottom. (The edge of a ballfield, playground, sidewalk, or road might be used.) Such a site would allow you to plot the starting points in a straight line and at about the same level. This makes it much easier to actually drew the map.

Sites that don't allow you to layout the starting points in a straight line and/ or at the same level can, of course, also be used; but additional computations and field measurements must be done before the map is drawn.

Hartz Pond: The site for which this lesson Plan has been written is the Hartz Pond E.E. site on Mingo National Wildlife Refuge. From USGS topographic maps of the area, the students can infer that the Pond is at an elevation of 410 ft. The north edge of the pond has 10 numpered stakes along it which will be used as the starting points. These stakes are at 10 foot intervals, and since they are all at the water's edge they are all at 410 ft. elevation. (It is not really necessary to know the actual elevation of the starting points. Since the points are all at the

same level they could be artitrarily called 0 elevation and changes recorded as relative measurements--- 2 feet higher than the starting point, 4 feet lower, etc.) Although the points are at the same level they are not in a straight line and as will be shown later, special measurements need to be made to enable you to plot the points correctly on your map.

Procedure: 1. At the site assemble the class at the pond's edge and pose the following problem: Where would the shore line of this pond be if we raised the water level four feet? ten feet? Encourage the students to discuss ways to solve this problem as time allows. Then explain how a fairly precise topographic map of the area can be constructed that would show the solution to this problem.

Explain to the students that for the mapping we need a starting point (the pond's edge); a method of determining changes in elevation (the sighting level and range pole); something to measure linear distance (measuring tape or marked rope); and a system that allows us to accurately record the data and systematically use it to draw a topographic map (for this exercise we use a system of parallel lines up a hill and the students find the elevations along these lines from a known starting point.) See Illustrations.

2. Collecting the data: Start by dividing the class into groups of five or six. Explain how the sighting level and range pole are used. To set up the system of parallel lines the students will be following, you can have the class actually lay the lines out using a string and compass, or better yet make sure that the class is well enough versed in the use of the compass that the string can be omitted and just the compass used to keep the students on an imaginary line up the hill. A line will be run from each starting stake, and since at the Hartz Pond ten stakes are used ten lines will need to be run (due north by the compass). At this site ten lines ten feet apart and 100 feet long work well, but at other sites other measurements will probably need to be used.

After the lines (real or imaginary) have been laid out or discussed, the students then use the sighting levels, range poles, and measuring tapes to record the horizontal distance between two foot intervals of elevation along the lines. (see illustrations) Each group of students should run at least two lines. A different data sheet should be used for each line.

Two special problems need to be mentioned here. First, the initial measurement at the pond's edge will have to be taken backwards i.e. with the range pole at the water's edge rather than the sighting level being there. Otherwise, the person doing the sighting will be standing in water. Second, a way needs to be found to accurately depict the shoreline of the pond and the location of the numbered stakes. If this is not done there will be no way to recreate them to actually start drawing the map. The easiest way to arrive at a true shoreline is to lay out a line at right angles to the lines running up the hill (in this case it would be east-west). The line should be as close to the pond's edge as you can get it. From this line you can then find the horizontal distance back down the hill to each stake at the water's

edge. These field measurements can then be used to plot the shoreline and stake location when you draw the map.

A third problem will be encountered on sites where the starting stakes are not all at the same elevation. To correct for this, choose the starting point of one of the lines as an arbitrary 0 reference and using the sighting level find a point on each of the other lines that is either at the same elevation or at a multiple of two feet relative to this point. Mark this point on each line and use it as the starting point for further measurements. To reconstruct these new starting points when you draw the map, use the technique described earlier for locating the ponds edge. If you actually know the elevation of some point on your hillside, use this point instead of an arbitrary 0 reference.

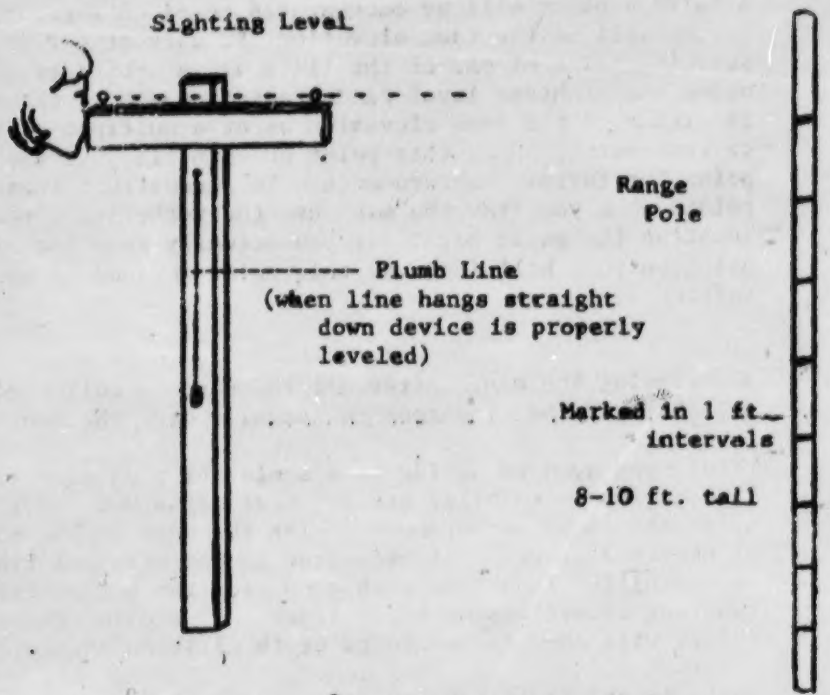
3. Drawing the map. After all the data is collected, you may want to return to the classroom to actually draw the map.

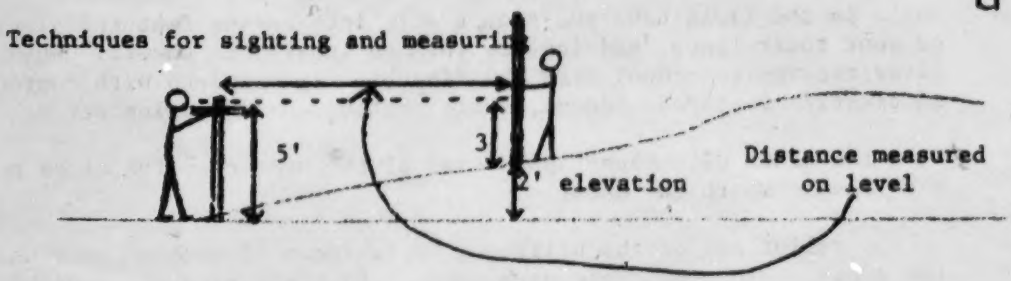
First, you need to decide on a scale for your map (depending on paper size, distance up hill, etc.). Next, draw your east -west line and using the field measurements, plot the edge of the pond and location of numbered stakes. Lightly draw in the parallel lines you laid out up the hill. Then have each grop plot the horizontal distance between two foot elevations on their lines. Connecting the rows of plotted points will show the contours of the hillside mapped.

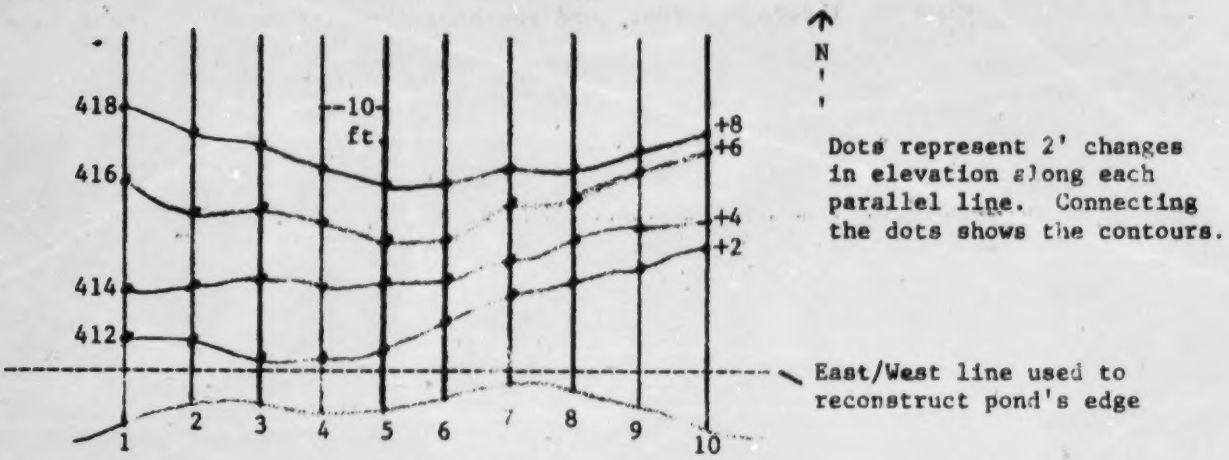
Follow Up: While in the field have the groups note interesting features along or near their lines, and include them on their data sheets. When the class returns to school draw the finished map complete with contours, interesting features, legend, scale, title, and N/S orientation.

Show the class USGS topographic maps of the area that the class mapped. Have them compare the maps.

Make a relief map of the hillside. Put pieces of carbon paper under the class's map, and trace each contour on a separate piece of ¼" thick cardboard. Cut along the contour for each piece of cardboard, glue the layers together, and you have a relief model of the refuge hillside.







Pond at 410 ft. elevation

Mingo Lesson Plan # 7
Creative Writing and Nature

Subject Area: Language Arts

Grade Level: 6th

Purpose: To use the sights and sounds of nature as a stimulus for creative writing.

Equipment: Clipboards, paper, pencils

The Site: Any relatively natural outdoor area can be used.

Activities: Four examples of creative writing and thinking in the natural environment are given.

1. Group Story: At a spot that particularly sparks the imagination (an old home site, cemetery, stream side) start a story. Let each student add something to the story - the more imaginative the better.

2. Cinquain and Haiku Poetry: Both of these forms of poetry have a set number of lines and words per line and do not rhyme. They are easy introductions to a subject area that many students of this age group would regard with distaste. With some groups it works best ot tell them they are writing poetry after the fact.

The procedure for writing a cinquain is as follows. Select some distinctive natural feature such as a tree stump, rock formation, etc. Have the group get comfortably arranged and ready to write. Tell them to write the following: one word to name the subject; two words to describe it; four words to tell how you feel about it; one word that sums up the subject.

In the strict sense cinquain poetry has 5 lines with 2,4, 6,8,2 syllables per line. However, form is not the important factor, the expression of feeling is. Poetic license permitted and encouraged. (See attached sheets for examples of cinquains and information on Haiku.)

3. Wishful Thinking: Pick a good spot where everybody can sit or lie down and remain quiet for a few minutes. Then ask everyone, "If you could be anything other than a human being, what would you like to be out here and why?" Have them briefly write down their feelings.

4. Role Playing: Have everyone become an object in the environment and then write a first person history of the area as seen by that tree, rock, flower, etc. This can either be done by taking a factual approach (what probably would have happened on that spot), or a highly imaginative approach.

A variation of this type of role playing can be done where historical features can be found (old home sites, cemeteries, old roads, etc.). For example, have the students select a tombstone in a cemetery and write about the life or death of the person burried there.

Follow Up: The results of the classes' creative efforts should be shared both in the field and back in the classroom.

Further skills can be developed by writing a factual discription of the field trip, writing a letter to someone telling them about the trip, etc.

Haiku and Cinquain Poetry

Characteristics of Authentic Haiku:

Haiku is a three line verse form which originated in 13th century Japan.

Three Lines: Line one contains 5 syllables; Line two contains 7 syllables; Line three contains 5 syllables.

English translations do not always follow the above pattern. Each poem includes the season, location, reference to nature. No subject matter deals with simple ordinary things. No rhyme. (Japanese words end in vowels or "N" sounds) Few articles or pronouns - syllables can be used for better purposes. Thought comes first; then the syllables are adjusted to fit the form.

Some Student Expressions

Mother Tree
Stretching out her arms
To protect the world from the
Fury of the skies.

Sadness
The dying of the flowers,
the turning of the grass,
the autum breeze.

Cinquain Poetry

A five line, non rhyming poem with the pattern of 2,4,6,8, 2 words or syllables per line.

Some Student Expressions

River
Rushing Beauty
Carving future legends
Sharing only blissful moments
God send

The wind
Moans through the oaks
Barren trees of winter
But the treads of life are retained
Acorns!

MINGO LESSON PLAN # 8
Art and Nature

Subject Area: Art

Grade Level: Elementary

Purpose: To use the natural environment as a source of materials and stimuli for student art activity.

Equipment: Variable with activity

The Site: Any natural area where collecting of some natural objects is permitted.

Activities: 1. Run through some of the activities in Mingo Lesson Plan #1, calling particular attention to form, color, and patterns. 2. Any of the following activities can be done in the field, or the material can be taken back to the classroom for use. As many activities as desired can be done.

Collage: Take a short walk through the woods. Have the students collect objects of different colors, shapes, textures, etc. Using heavy paper, rubber cement, mount the materials to make a collage.

Charcoal Art: Find some distinctive feature in the area. Arrange the group around it and sketch the object using charcoal. (Charcoal can be found in many areas from old fires, or you can make your own fire and let it burn out beforehand) Variations would be to use other natural colors (walnut hulls, iron ore, etc.) or model the object in a native clay.

Leaf Art: Have the students collect oddly shaped leaves; glue them onto paper; and with bits of paper and majic marker, use the leaves as a basis for cartoon [illegible] figures or caricature.

Rubbings: Many designs and textures of nature can be captured by rubbings. Using rice paper or school manilla drawing paper, place the paper over the object to be copied, and rub with a large wax crayon to bring out the differences between raised and cut surfaces. Large rocks and the bark of many trees make interesting designs. Rubbings of historic objects such as tombstones can be used as the basis for units in other subject areas.

Additional Activities: Nature provides a vast storehouse of shapes, colors, and textures for use in works of art. More adventuresome groups might wish to tap this storehouse at a slightly more complicated level. For instance, many plants can be processed to yield a variety of dyes; native plant materials can be woven or braided to make original creations. Ceramics from native material is feasible.

The area of native crafts is extensive, and many crafts can be tied into other subject areas such as American History. The following references will get you started:

Davidson, Mary Frances, The Dye Pot. Published by author- Rt. 1, Gatlinberg, Tenn: 19

van der Smissen, Betty and Oswald H. Goering, Nature Oriented Activities. Iowa State University Press, Ames, Iowa, 1965.

Wigginton, Eliot, The Foxfire Book and Foxfire II Doubleday and Co., Inc. Garden City, N.Y. : 1972 and 1973.

MINGO LESSON PLAN #9
CEMETERY STUDY

Subject area:	Social Studies
Grade Level:	6th
Purpose:	The primary purpose is to provide graphic data to demonstrate how changes in health care in the U.S. have extended the average life span. Secondary purposes are to provide a focus for discussion of death and burial customs, and to provide exercises in math, language arts, and art.
Equipment:	Clipboards, pencils, data sheets
Pre-visit activities:	The fact that strong social attitudes are involved when dealing with the subject of death and burial should be discussed with the class. The point should be made that the field work at the cemetery must be done in a careful and respectful manner. Any fears or prejudices should be fully discussed before the trip.
The Site:	Any fairly large cemetery that dates from the late 1800's will work for this activity. What is needed is enough legible tombstones so that various trends of interest begin to show up. Older cemeteries with ornate tombstones are best for the art and language art activities.
Field Activities:	The main part of the field work is collecting the raw data from the tombstones. Divide the class into groups, and assign each group a part of the cemetery to cover. The students can fill out a sheet for each gravestone (see example A), or a master chart can be made for each section, with places for the information.
Analysis of Data:	Analysis of the data collected can be a tedious job unless each group is assigned a particular task to do. The completed analysis should be displayed for the entire class to see. For the purpose of making comparisons, a number of averages will have to be found. This will give the students practice in addition and division. Comparisons and Trends. The following comparisons should be made and the implications discussed: 1. Compare the average age of death for the cemetery as a whole with the average age of death today.

2. Compare the average age of death before some appropriate date (say 1900 or 1920) with the age after that date. (try this same comparison after dividing the data by sexes.)

3. Compare the number of infant deaths before 1900 or 1920 with those after that date.

Graphs. Graphs are a good way to make comparisons and show trends. Have the students make the following graphs:

1. Number of deaths contrasted with year of death. Look for peaks showing wars, epidemics, etc.

2. Number of deaths by month of year.

3. Number of male and female deaths against age at death (wars, childbirth).

4. Male and female age at death by year.

Other graphs will probably suggest themselves as analysis continues. The students should develop logical explainations for the trends noted.

Questions to Discuss. As time and interest allow, the following questions should be explored.

1. What is the purpose of having a permanent grave marker? What does it mean to the individual--to his family?

2. Are the sizes and locations of markers and the social standing of the individual related?

3. Why do some parts of the cemetery have a lot of unmarked graves? (paupers)

4. Has there been a change in ornamentation and content of marker inscriptions

5. Has the basic design of markers changed over the years?

6. At what time did inscriptions in foreign languages cease?

7. Do the names suggest certain nationalities or ethnic groups?

8. Can a correlation be made between infant deaths and family size?

9. Can migration patterns into and out of the area be determined?

Other Activities. See lesson plans 7 and 8 for related activities in language arts and art. Types of stones used for markers and rate of weathering can be used for a geology exercise. The cemetery could be mapped in connection with a unit on maps.

Mingo Lesson Plan #10
Land Use Study and Simulation Game

Subject area: Social Sciences

Grade Level: 6th

Purpose: To demonstrate through an on site investigation and simulation game, the complex factors that have to be taken into consideration when land use planning is done.

Equipment: Clipboards, papers, pencils, activities sheet. Simulation game role sheets and rules.

Procedure: The activity is divided into two sections. The first section is a field activity during which the students will be required to evaluate a site as a potential place for a pioneer family to settle. The second section will be a land use simulation game back in the classroom which will investigate a similar site, and decide its best use today.

The sections are designed to be used together, but may be used as two separate lesson plans.

Section One
Field Activity: The field activity can be done in any relatively natural area that offers a variety of terrain and locations.

The class should first be divided into groups of 5 or 6, and each group assigned a different area to explore. Each group should be given Activity Sheet One (see attached sheet) which asks the students to assume the role of a pioneer family moving into the area, and assess the potential of their site for a homestead. The students should evaluate the site both pro and con as to its potential for providing the following:

1. food
2. shelter
3. clothing
4. drinking water
5. transportation
6. source of power if needed

The students will also need to decide what kind of living the pioneer might make in that area (lumbering, farming, fishing, trapping, livestock, or some combination), and consideration will also have to be given to the effects of climate, soil types, relative location, etc. on the desirability of the site.

After each group has filled out the data sheet for their site, reassemble the class and have each group report on their findings, and on their recommendations for the site.

Section two

Simulation Game: This simulation game builds on the pioneer home study, and places it in a modern context. The steps for playing the game are as follows:

1. The format is that of a zoning board hearing. The issue in question is how a particular piece of land should be used. The class will be divided into teams, and each team assigned a role to play.

2. A team of judges will be needed to conduct the hearing. This team is the Regional Zoning Board, and they will listen to various proposals, ask questions, and finally rule on how the land will be used.

3. Several other teams will be needed to play the role of advocates of particular schemes to develop the land in question (see the accompanying role sheets for a description of the land and the roles to be played). The teams will decide on a presentation of their viewpoint, give the presentation, and after hearing the other teams' presentations, give a brief summary of why they feel that their proposal is superior.

For their presentations, each team should consider the following points: What are the benefits of their proposal (economic and social) to the individual and community? What effects will a decision in their favor have on future generations? Is the proposal feasible? (Here the points discussed under the pioneer home study should be brought in.)

4. After considering the evidence, the judges will rule in favor of one of the proposals. The judges should ask questions of the different groups during the rebutal period.

5. After the judges rule, further discussion of land use problems should be encouraged. The class as a whole may want to vote on the different proposals.

Activity Sheet One

The time is 1850, and you are a pioneer family moving into this area. You are looking now for a place to settle, and you have to decide whether this site would be suitable.

1. Describe the site you are evaluating. (What is the terrain, vegetation, soil?)

2. How could you make a living here? If there are several ways, name them.

3. Make a list of the basic needs this site must meet for your family to be safe and happy here. Evaluate the site's potential to meet these needs, both pro and con.

4. Make a recommendation and support it as to the suitability of this site. Should your family settle here or look for another place?

SIMULATION GAME

Land Description:

The land in question is a 400 acre tract on the edge of Mingo National Wildlife Refuge. About 300 acres of the land is flat bottomland, adequately drained and with good soil. It is covered with mature timber. The remaining 100 acres is higher, well drained, land on a ridge overlooking the refuge. The scenic view of the refuge, together with the plant growth and general topography, make this a very attractive area. The entire 400 acres is roadless, although a road comes close to the 100 acre portion. The land is located about 5 miles from Puxico, Mo.

Role Descriptions:

1. Local Farmers. You are a group of farmers that own farms on one side of the land under question. Your feelings are that the land has excellent potential for soybean farming, and that with the present shortage of usable protein in the United States, you should be alowed to add this land to your farms.

2. Mingo Refuge. You are the Mingo National Refuge Staff. You feel that the refuge should be allowed to buy the land. The 100 acres on the higher ground is needed as a link in a new hiking trail, and the whole area is good wildlife habitat. Part of the lower area could be used to grow food crops for wildlife.

3. Sawmill Operator. You are the owner of a local lumber mill. The trees on the 400 acres are just right for sawlogs, and you feel that you should be allowed to buy the land so that you can harvest the timber.

4. Real Estate Developer. You are a local building firm. The 100 acre portion of the tract would make ideal home sites, and you want to develop a resort community. About 75 homes would be built on part of the land, while the lower area would be used as a recreation area for the home owners.

5. Wilderness Society. You represent the local chapter of the Wilderness Society. The 400 acrea tract borders Mingo's already existing wilderness area, and you feel that it should be added to the wilderness area. The tract is a good example of Southern Lowlands, and has many unique species of trees and animals. Most of the land like this in the South has already been cleared for farming.

6. Cement Factory. You own the local cement factory. The higher area of the land in question has good deposits of high grade limestone, and the lower area has deposits of sand and gravel. You feel that you should be allowed to buy the land and mine these resources.

Mingo Lesson Plan # 11
Aquatic Biology

Subject Area: Science/ biology

Grade level: 6th through secondary depending on emphasis

Purpose: To familiarize the student with basic aquatic organisms, and allow the students to discover the interrelationships of these organisms with each other and their environment.

Secondary purposes, depending on grade level and time available, are to investigate aquatic succession , and make some inferences about the relationships between aquatic organisms and specific environmental factors such as oxygen content and temperature.

Equipment: Hipboots for some, sein, dipnets, collecting pans, hand lenses, identification books, (see Biblio.) Also stereo microscope, and water testing kits if available.

The Site: The site for this activity is a pond at Mingo's main ESA. Many farm ponds, sloughs, or streams could be used, however.

Activities: Previsit. Familiarize the students with the activity, how to use the equipment, organization for the trip, etc. Have the students discuss questions such as what organisms they could expect to find (make sure insects and other inverts are mentioned); What basic needs do all the organisms share? (food,oxygen,etc.)

Field Activity. The field activity is composed of a series of explorations by the students. For each exploration, the students are given an activity sheet (see accompanying samples) and given a set time for exploring the area and completing the sheets. The teacher should conduct a discussion of the results after each sheet is completed, and pose appropriate questions to bring out desired points. The tempo and level of the field activity can be controled by the # of activity sheets used and length of discussion.

If staffing and equipment permit, the class should be divided into two groups for better discussion sessions. Within these groups the students can work in pairs to complete the activity sheets.

Activity A

Have the class spread out around the pond, and take about 30 min. to complete activity A.

After the 30 min. period is up, assemble the students and discuss the finds. Have the students compare different organisms found for similarities and diferences. See if the class can formulate some groupings of orgainsms on the basis of anatomy, habitat, etc. Make sure that the animals are handled carefully and returned to the pond.

Activity B 11/2

Have the students find a comfortable place to complete activity B.

After the students have had time to complete the sheet, discuss the results. Bring out the following points: 1. The cyclic nature of the relationship; 2. The importance of each member of the cycle (ask what would happen if one group was removed); 3. The relationship of the cycle to the flow of energy in the environment. More advanced classes may want to investigate relative biomass and energy content, predator prey relationships, etc.

Activity C

After the class has throughly investigated the types and relationships of organisms in the aquatic community, they may wish to proceed to a study of the successional trends in their aquatic area. Have the students complete activity C.

When the students have completed the sheet, discuss their guesses as to the future of the area, and lead them into a formulation of some general successional trends and concepts.

Activity D.

Activity D can best be completed if water testing kits are available. However, predictions and discussions of the reasoning used may be of interest to the class even if the actual tests can not be run. Actually using the tests to check their predictions will give the students excellent practice in scientific technique.

After the tests are run (the tests should be run after completing Activity Sheet D), explore the following questions: 1. Were the predictions accurate? Why or why not? 2. Is it necessary to have sophisticated equipment to make general determinations of temperature, oxygen content, etc. 3. What else would we need to know before we could tell if it was safe to drink the water? 4. What different results might we expect at different times of the year?

After the activities are completed, the students should be led on a general review and summary of the days activities.

Morgan, Ann Haven. Field Book of Ponds and Streams, G. P. Putnam's Sons New York, N. Y. : 1930.

Pond Life, Golden Nature Guide Series, Golden Press, New York, N.Y.

ACTIVITY A

1. Study the physical characteristics of your area. What is the source of water and general terrain? Note water depth, bottom type, water movement and color of water.

2. Study the plant and animal life in your area and try and find as many different organisms as possible. Fill in the chart on the back of this sheet for the different plants and animals you find. For the animals, try and determine what they eat and how they breathe.

11/4

PLANTS AND ANIMALS FOUND AT _____

DATE: _____

NAME OR IDENTIFYING SKETCH	DESCRIPTION OF HABITAT IN WHICH FOUND	NOTES & OBSERVATIONS	NUMBERS

ACTIVITY B

Write the animals and plants you have found today in the appropriate places in the diagram below. Put in arrows to show the relationships between these organisms.

Light
&
Nutrients

Plants

_____

_____

_____

Reducers (decomposers)

_____

_____

_____

Herbivores (planteaters)

_____

_____

_____

Carnivores (meateaters)

_____

_____

_____

ACTIVITY C

You have investigated carefully the physical and biotic characteristics of this area as they are right now.

Answer the following questions, and predict what this area will look like 50 years from today.

1. What happens to the plants and animals in the pond after they die?

2. What happens to the dirt and silt washed into the pond?

3. State what you think this pond will look like in 50 years. Back up your guess by listing evidence you can see here today.

ACTIVITY D

1. What are the things that all animals need to live in the water?

2. Based on the aquatic animals you found, and the charts on the back of this sheet, predict the following characteristics of this water area;

   water temperature _____

   reasen:

   air temperature _____

   reason:

   pH # _____

   reason:

   dissolved oxygen count _____

   reason:

pH, OXYGEN, AND TEMPERATURE CHARTS

pH RANGES THAT SUPPORT AQUATIC LIFE

	MOST ACID 1	2	3	4	5	6	7	8	9	10	11	12	13	MOST ALKALINE 14
Bacteria	1.0													13.0
Plants (algae, rooted, etc.)						6.5						12.0		
Carp, suckers, catfish, some insects						6.0			9.0					
Bass, crappie						6.5		8.5						
Snails, clams, mussels							7.0		9.0					
Largest variety of animals (trout, mayfly, stonefly, caddisfly)						6.5	7.5							

DISSOLVED OXYGEN REQUIREMENTS FOR NATIVE FISH AND OTHER AQUATIC LIFE

	D.O. in parts per million
Cold-Water Organisms including (salmon and trout)(below 68°)	
Spawning	7ppm and above
Growth and well-being	6ppm and above
Warm-Water organisms (including game fish such as bass, crappie)(above 68°)	
Growth and well-being	5ppm and above

TEMPERATURE RANGES (APPROXIMATE) REQUIRED FOR GROWTH OF CERTAIN ORGANISMS:

Temperature		
Greater than 68°. (warm water)		Much plant life, many fish diseases. Most bass, crappie, bluegill, carp, catfish, caddis fly.
Less than 68°. (cold water)	Upper range (55-68)	Some plant life, some fish diseases. Salmon, trout, Stonefly, mayfly, caddis fly, water beetles, striders
	Lower range (Less than 55)	Trout, caddis fly, stonefly, mayfly

Mingo Lesson Plan # 12
Transect Study

Subject Area: Biology/ecology

Grade Level: Secondary

Purpose: To explore the relationship between certain physical factors in the environment, and the distribution of plants and animals in that environment. The activity will also give students practice in application of scientific technique to collect data, analyze the data collected, draw conclusions and form hypotheses.

Equipment: Data sheets, clipboards, Golden Nature Guide to Trees and Insects. Peterson Field to Trees and insects, Soil pH testing kit, hand lenses, thermometers, light meters. Each group of 5 students should be supplied with the listed equipment.

The Site: This lesson plan was written to be used at an E.E. site on Mingo Refuge, but it can be used equally well on any area of natural cover that possesses variation in habitat patterns.

Introduction. This activity is best used as an introduction unit to the relationships between plants and animals and their physical environment. As such it was designed to raise questions to be further explored in the field or classroom. The concepts of macro and micro climates, ecological nitches, succession, general taxonomy, and physiology can all be developed using this field activity as an introduction.

The students will need to be able to classify the plants and animals found during the fieldwork. The classification can be quite simple as listed on the accompanying data sheet, or it can be as detailed as the teacher desires. (See Mingo Lesson Plan #15 for an easy introduction to tree identification.)

Procedure. Either in the classroom before the trip, or when first arriving at the site, lead the group in the following discussion:

What physical things do we need to stay alive? -air, water, shelter (warmth, protection) food, etc.
Do all living things share these requirements?
Can some plants and animals live with different amounts of these things?
Do some have different requirements? Examples.
Do you think the supply or abundance of these "physical requirements for life" will vary in the area around you?
What do you think this would mean for the different kinds of plants and animals that live here?
How could we measure the physical factors out here? -- light meter, thermometer, pH kit, etc.
How could we record the plant and animal life here?

Then state that that is what the class is going to do--measure the physical factors in the environment, and the plants and animals that live here to see if we can find some relationships between the factors and where different species live.

Define a transect and quadrat for the class, and ask them what benefits can be gained from using them rather than collecting the data at random. (Able to compare data between transects, consistancy in recording data, can recheck data, statistical analysis, etc.)

Laying out the transect. When the discussion is completed, divide the class into groups of 5 and have each group lay out their transect lines. The length of the lines, interval distance, and area sampled at each station should be decided upon beforehand by the teacher. Factors such as terrain, density of cover, time available, objectives, etc. will all have to be considered. The lines can be laid out in different habitats (e.g. old fields vs mature woods) or crossing through several habitats to show change. At Mingo a 400 ft long transect is used with sampling stations every 100 feet. At each station, a 25 ft. radius is sampled for plant species, and a square yard quadrant is investigated for animal life. (You will probably want to use metric measurements).

The easiest way to actually lay out the lines is to give each group a ball of string and have them use a compass and 50 ft. tape to run the line a set length and direction from the starting point. Tape can be used to mark the intervals along the string.

Collection of Data. Before starting the actual collection, discuss the necessity of accuracy and consistancy in marking or making observations and recording data. Go over details about where to place the quadrats at each station, how to set up the sampling radius at each station, what direction to point the light meter, etc. What to do with unidentified species encountered should be discussed and a procedure agreed on by the whole group. (e.g. systematic exclusion, best guess, inclusion in "other" category etc.)

Analysis of Data. At each station along the transect line, the students should record the information requested on the attached data sheet -- one sheet for each station. The data collected can then be analyzed in a variety of ways to demonstrate different relationships and concepts. For analysis, the students should ascertain that a certain variation exists (e.g the number of oaks increased the further along the transect we got) and then find which changes in the environmental factors might explain this pattern.

Graphs are an excellant way to establish the existance of certain variations and correlations. Graphs should be made showing how each physical factor varies along the transect, and then compared with graphs of changes in numbers of oaks or earthworms, etc. as well as total number of species along the transect.

The attached example shows how two species of trees (oaks and cypress) vary along the transect line of Mingo, as compared with the amount of moisture along the same line. From this simplified example, it can be seen that the number of oaks varies quite closely with the amount of moisture.

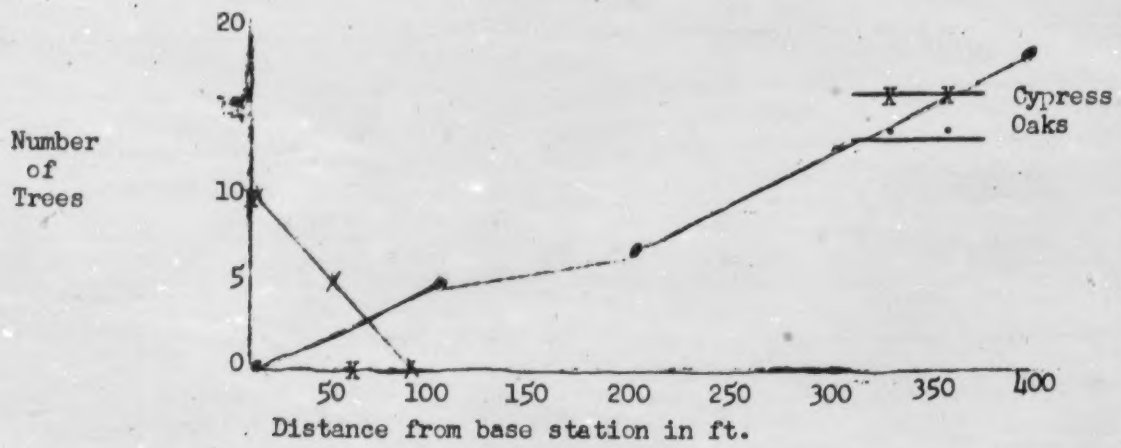
The idea of correlation or concommitant variation versus cause and effect should be discussed. (e.g. the # of oaks also varies quite closely with the elevation along the transect, but this is not a direct cause of change.) The students should be encouraged to propose additional investigations in the field and back in the classroom to "prove or disprove" the relationships uncovered.

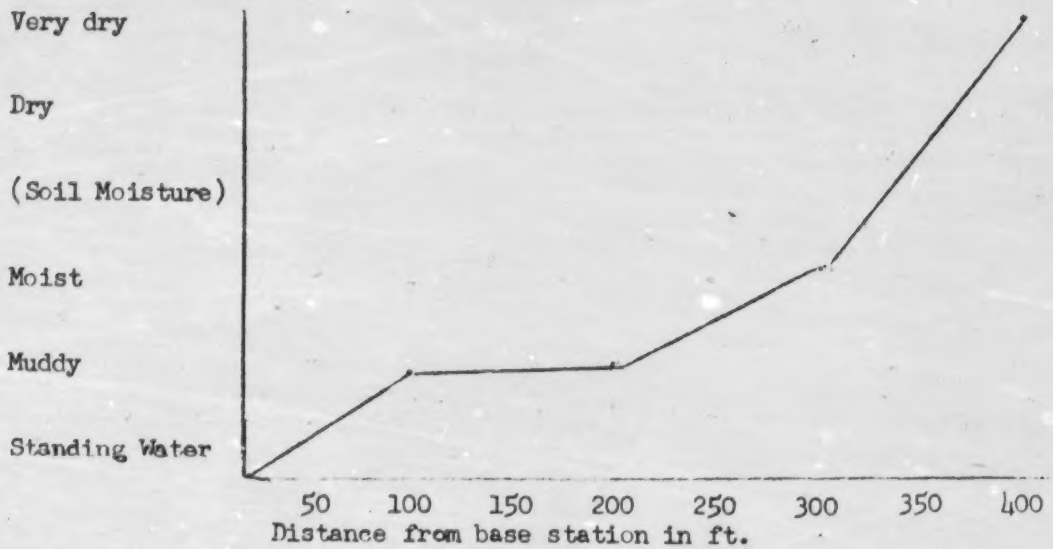
Comparisons between different transect lines to see if certain relationships hold up under similar or differing conditions could be useful here.

The field work and analyses are also good exercises in scientific technique—the need for consistancy in estimations and measurements, writing down all useful observations, etc. As the analysis progresses, make sure that students consider ways that errors might be introduced into the findings -- wrong identification, miscounting, changing conditions throughout the year, unusual human history of the area, misinterpretation of correct data, etc.

The teacher may wish to have each of the groups give a brief summary to the whole class on what they found on their transect. Discussion and debate could be encouraged on the similarities and differences, possible explanations, etc.

GRAPHS FOR TRANSECT STUDY





DATA SHEET

PLANTS WITHIN SAMPLING RADIUS	NUMBER
Oaks	
Maples	
Cypress	
Hackberry	
Winged Elm	
Persimmon	
Buckeye	
Hickory	
Walnut	
Spicebush	

ANIMALS IN QUADRAT	NUMBER
Beetles	
Ants/Termites	
Grubs	
Spiders	
Centipedes/millipedes	
Earthworms	
Snails	

List other important observations on back.

Site _____

Date _____

Transect # _____

Station # _____

DOMINANT VEGETATION
(Check one or two)

Tree _____

Shrub _____

Forbs _____

Moss _____

Grass _____

AVERAGE TREE SIZE _____

ENVIRONMENTAL FACTORS

DEGREE OF SLOPE _____

DIRECTION SLOPE FACES _____

SOIL MOISTURE
- a. standing water _____
- b. muddy _____
- c. moist _____
- d. relatively dry _____
- e. very dry _____

SOIL TEMPERATURE _____

AIR TEMPERATURE _____

SOIL pH _____

LIGHT METER READING _____

% CANOPY CLOSURE _____

MINGO LESSON PLAN #13
What Is a Tree

Subject Area: Biology

Grade Level: 2nd- 3rd

Purpose: To demonstrate the importance of trees, and show the inter-relationships of trees with their surroundings.

Equipment: Hand lenses, trowel, paper for chart, pencils, collections bags.

The Site: Any relatively natural outdoor area can be used.

Concepts: A forest or woods is a place where trees are the largest living things, both in size and number.

Many lives of different things depend upon trees for many reasons. Even things which aren't alive such as the soil, rocks, sunlight, and wind are affected by trees.

Each tree needs many living and non-living things to stay alive and to help it grow.

Procedure:

1. Once at the site, the class is to be divided into groups. Each group is then told to choose a tree which they would like to study. Suggest that they find a large tree, preferably one which has a lot of smaller plants and possiby some animals near it.

2. Have the group guess how tall the tree is compared to some well known landmark. Try to say how or why this tree is different than a nearby tree. Talk about the type of bark, the shape of the trunk, and the shape of the leaves.

3. Look for things living on the trees, such as birds, squirrels small plants, or possibly a sign of life such as a hole or some scratched or chewed bark. Talk about what type of life these signs might be evidence of.

4. Look under the tree and find as many different plants and animals as you can.
   a. Turn over some leaves on the ground, and look for insects.
   b. Look for animal holes under the roots.
   c. Are there small trees under the large ones? Do you think that the small trees will get enough sunligh and water to grow?
   d. Are the same small plants living under your tree as are living under trees nearby?

5. How could your tree affect your life? (Shade, lumber, fuel, protection) Are trees more or less important today than they were in your grand parents time?

6. Draw your groups tree in the center of a piece of paper. Then write down things that are on or around the tree along the edges of the paper. Draw direction arrows from the tree to the words. In the word list be sure to include sunlight, water, soil, and air.

7. Walk around and look at some different trees. Are there plants and animals around them? Are they the same ones you saw around your tree?

8. Gather the class together, and talk about what the different groups saw. Compare the tree charts to see how they differ, and talk about what might have made these differences.

MINGO LESSON PLAN #14
Soils & Erosion

Subject Area: Science- Agronomy

Grade Level: 6th

Purpose:

1. To demonstrate that soil is made up of rock particles, organic material, air, and water.

2. To show that nature produces a definate layering in the soil that can be seen as a soil profile.

3. To present some aspects of the soil erosion problem.

4. To serve as a general introduction to more detailed classroom work on the subject.

Equipment: Small digging tools, bags to carry soil samples, bean seeds for growth tests, pots, samples of humus and rock dust. (tailings from water well drillings are a good source of ground rock.)

The Site: This lesson plan was designed to be used on the school grounds of Puxico Elementary School, but any area with some erosion and a place where soil profiles can be uncovered will work.

Procedure: A. Classroom Discussion:

1. Ask what is soil. Pass soil around so that students can look at what itis made of.

2. Elicit the information that it is made up of rock particles, organic material, and, and water.

3. Show each of these ingredients, and ask if soil could be made by combining them. Would it be as good as nature's soil?

4. Suggest that the class experiment latter to see if all of the above components are important by growing plants in various mixtures of the components as follows:

a. dry ground up rock
b. rock and water (press out air)
c. rock, water, and air (shake to add air)
d. rock, and water, air, humus, and worms
e. measure the rate of growth for each mixture. Use a pot of real soil for a control.

5. Discuss nature's way of making soil

a. briefly mention natural forces at work to break down rock. (freezing, lichens, etc.)

b. pose problem of how this broken up rock becomes soil.

B. Fieldwork

1. Tell the class that they are going out on the school-ground to investigate how soil is formed, and look at some aspects of soil erosion.

a. lead the class to the gully where a good soil profile is visible.
b. guide the class in a discussion of how each soil level is formed e.g. how vegetation and soil organisms and water transform ground rock into soil.
c. take back samples from each horizon and compare growth rate of plants in each level.

2. Tell the class that they are now going to take a look at one of the major environmental problems in the U.S. today-soil erosion.

a. study the way the gully has formed
b. note erosion on the construction site
c. point out how vegetation holds back erosion (show undercut bank, and upper end of gully with more grass and less erosion).
d. Briefly get into ways to prevent or correct erosion. (planting trees and grass, check dams, etc.)

C. Return to Classroom

1. Discuss and tie together the formation of soil and the loss of soil by erosion.

a. time needed for soil to form
b. rapid loss due to erosion, and importance of loss

2. Answer questions, and discuss problems.

Mingo Lesson Plan #15
Observing and Classifying Trees

Subject Area: Biology

Grade Level: All

Purpose: The primary purpose is to provide experience in observing characteristics of trees useful for identification. A secondary purpose is to provide experience in constructing dichotomous keys and experience in the classification process in general.

Equipment: Peterson Field Guide to Trees; Golden Guide to Trees; Trees of Missouri

The Site: Any area that contains a variety of tree species in a small area

Field Work: Before the lesson starts, the 8 or 10 species of trees to be used should be marked by the teacher. (They should not be labeled with their name at this point)
The students should be shown the marked trees and told to look at the trees to find similarities and differences among them. If identification is to be based on leaves, have the students concentrate on leaf characteristics, if by the bark, on the bark, etc. After 5 to 10 minutes, call the group back together and list or discuss the differences observed. (The observing a twig exercise from lesson plan #1 might be used as a prelude to this activity.) Next, have the students construct a dichotomous key (working in groups or singly) ; ; using the marked trees and following the instructions on activity sheet A.

After the keys have been completed, have the students trade keys and try to use someone elses key to sort out the sample trees. Compare the results, and discuss the reasons for differences.

Review the activity, discuss the importance of the classification process, its usefulness and uses in science and everyday life.

At the end of the exercise, the teacher should supply the names of the marked trees, or the students can look them up using the field guides. Have the students practice identifying other trees in the area, using their keys and associating the correct name with the tree.

Activity A

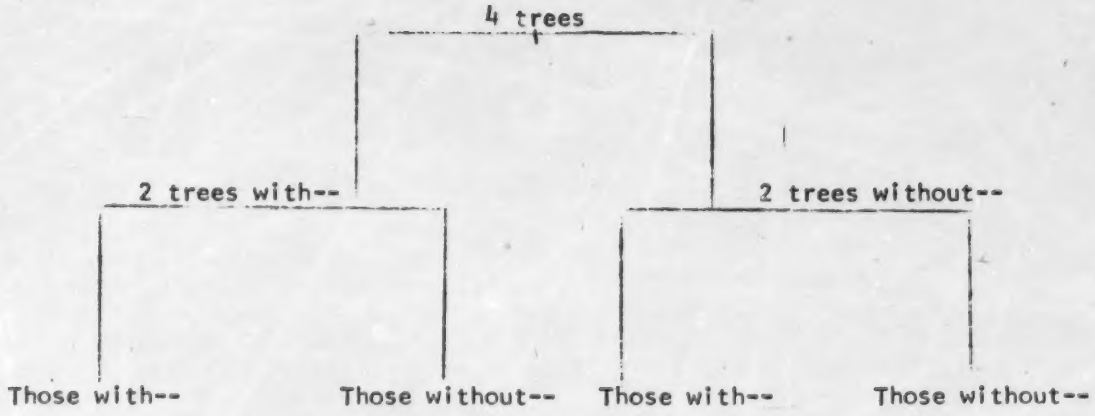
You have carefully looked at the characteristics of some of the trees around you. Now you are going to devise a method for classifying and identifying these trees on the basis of these characteristics.

1. Divide the trees into two groups bases on the likeness and difference you have observed. Be sure and state specific characteristics that someone else could see and understand.

2. Make a large KEY on the paper provided starting with the two groups you've made. Write the reasons for the two groups you've made.

3. Continue to divide the two groups into two more groups and write the reasons. Continue dividing the trees until each has been singled out.

Here is a sample key



MINGO LESSON PLAN [redacted] 16
Creative Communication Using Nature
As a Stimulus

Subject Area: Art and Lanuage Arts

Grade Level: Elementary

Purpose: To use nature as a stimulus for student art and language art activities. To explore art and language arts as a means of communication.

Equipment: The following equipment will be needed for the series of activities:

Activity 3: Rubbings -- heavy rice paper (heavy manilla paper will work) one sheet per student. Large crayons-½ per person.
Activity 5: Role playing -- pencil and paper for each student.
Activity 6: Charcoal Art-- Charcoal and drawing paper, one piece per person. Charcoal can frequently be found on the site, if not build a fire and let it burn out beforehand.
Activity 8 -- Concrete Poetry -- pencils, paper, examples sheet.
Activity 9: Collage -- construction paper, glue

Activities: The following series of activities is an example of how art and language art exercises (See Mingo Lesson Plan 1, 7, and 8) can be combined for a 2 hour field activity. The number of activities and their arrangement can be changed to fit the time and interest of the group involved.

Procedure

Ask students: What is communications? Why communicate at all? Try to draw out answers such as to work together; to express emotion; to express opinions; etc. Ask: How can and do we communicate? Draw out answers such as by pictures; by drawings, writing, etc.

Activity 1

Beautiful vs Ugly. Send the students out to find one thing that is ugly and one thing that is beautiful. Have each one tell the rest of the class why they think the way they do. Point the differences in opinion. Ask: Is one opinion wrong? Why do differences exist?

Activity 2

Observing a twig. Have the group form a circle and pass around a small twig. Have each person make a new factual observation about the twig as it is passed to him. See how many different observations the group can come up with.. Encourage use of all senses. Have the group discuss what good observation has to do with communication.

Activity 3

Point out that the sense of touch is one frequently neglected or ignored. Have the students spend a couple of minutes touching different surfaces; rocks, soil, Ask: How can one communicate texture?

Rubbings: Pass out materials; rice paper and large crayons. Have students choose a surface. (rock, tree etc.) place paper on surface, and rub entire sheet with the length of the crayon. This will "capture" the texture of the subject.

Activity 4

Point out that the last two activities have dealt with factual communication, and that the next activity will add another dimension.

Wishful thinking: Have the students consider for a few minutes what object, plant or animal of the area they would wish to be if they could. Have each name his choice and tell why. Move right into activity 5.

Activity 5

Role playing: Have each student write a history of the area as seen through the eyes of the object he picked for activity 4. The students can take either a factual approach or a highly imaginative one. Have several read their compositions. Discuss what elements -imagination, idividu alism, have added to this communication.

Activity 6

Charcoal Art: Find a distinctive figure or feature in the area (stump, tree, stag) Arrange the group around it and have them sketch the object using charcoal (see equipment). Encourage creativity rather than expect reproductions. Share the drawings with the group when completed.

Activity 7

Tell the group that next we are going to add words to the art.

Cinquain. Have the students write the following on their drawing:

Write 2 descriptive words about the stump (what it looks like)
Write 3 action words about the stump (things happening to it - changes)
Write a short phrase (4-5 words) that tells how the stump effects the rest of the environment (its value or usefulness or any thought you have about the stump)
Write one word that sums up everything about the stump (a word that suggests a comparison, an analogy, or synonym)

Now if you wish to go back and give a title to what you have written, you may.
Congratulations! You have just written a poem in a form called cinquain.
Discuss how the poem and drawing together make a more forceful form of communication than either separately.

Activity 8

Concrete poetry: Tell the group that concrete poetry goes one step further to actually combine words with pictures, graphs or linear art forms. It is free verse, no rhyme or meter and can take one of three forms: visual, story, or factual. As the example sheet shows it's a particularly fun combination of art and poetry.
Give each student an example sheet. Go over each type, answering questions.
Then have them compose their own examplesof each form. Share results.

After the last exercise is completed, ask one of the students to sum up the field work. Ask them their opinion and feelings about art and poetry, and whether they think it is an important form of communication. Discuss why or why not.

Activity 9

Collage: Before returning to the classroom, have the students gather objects of different colors, shapes, textures, etc. Return to the classroom and have the students glue materials on to heavy construction paper to form a collage.

CONCRETE POETRY- Examples

Type 1--Visual: Words arranged in picture form.

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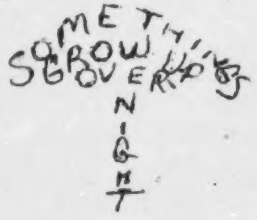
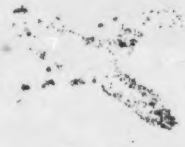


Type 2: Story: The words make a statement, and their arrangement completes the action and reveals an ending.

I tOUCHed a bUG.

I sneaked up on a frog.



Type 3-- Factual: Expression of idea, fact or image by use of the spatial relationship between words.

WATER		OIL		"LIFE"	"DEATH"
fish	swim	ground	COW		
		OIL		ME	Grass
				Grass	Ground
				Ground	ME

HAIKU AND CINQUAIN POETRY

Characteristics of Authentic Haiku:

Haiku is a three line verse form which originated in 13th century Japan.

Three lines: Line one contains 5 syllables; line two contains 7 syllables; Line three contains 5 syllables.

English translations do not always follow the above pattern. Each poem includes the season, location, refererence to nature. No subject matter deals with simple ordinary things. No rhyme. (Japanese words end in vowels or "N" sounds) Few articles or pronouns - syllables can be used for better purposes. Thought comes first; then the syllables are adjusted to fit the form.

Some Student Expressions

Mother Tree
Stretching out her arms
To protect the world from the
Fury of the skies.

Sadness
The dying of the flowers,
The turning of the grass,
The autum breeze.

Characteristics of Cinquain Poetry;

A five line, non rhyming poem with the pattern of 2,4,6,8,2 words or syllables per line. (See activity 7 for detailed instructions on writing cinquains.)

Some student Expressions

River
Rushing beauty
Carving future legends
Sharing only blissful moments
God send

The wind
Moans through the oaks
Barren trees of winter
But the threads of life are retained
Acorns!

Mingo Lesson Plan #17
Solid Waste

Subject Area: Biology/Social Studies

Grade Level: 6th through secondary depending on emphasis

Purpose: To familiarize the students with the magnitude of the litter problem in the United States and provide a focus for a discussion of more effective use of resources.

Equipment: Large collection bags, data sheets to record types and amount to litter.

The Site: Unfortunately almost any stretch of roadsite will work for this study. Safety of the students should be a prime consideration in selecting the road to use. This plan was developed for use at Mingo National Wildlife Refuge with the Youth Conservation Corps.

Activities: Basically the plan is to collect litter along a one mile stretch of road and record the types and amount of litter found. This data can then be compared with nationwide surveys, and the overall magnitude of the problem discussed. On additional activity can be to investigate the recycling/ energy problem and the longevity of certain types of trash.

Procedure: Discuss with the class whether they think the problem of litter is really a major one. Tell them they are going to investigate one small part of the litter problem and explain how the survey will work.

Before you actually start the survey pass out activity sheet A and help the students set up different classes of litter (cans, bottles, paper etc) and decide on standards for counting (is a newspaper one item of litter or 2$\frac{1}{4}$, etc?) A method for collecting data on the percentage of recyclable trash should be discussed. Be sure and dispose of the trash collected in an acceptable maner and recycle what is possible. After the data has been collected compare your results with the data from the nationwide surveys. Discuss some of the implication in terms of tax money lost, energy lost, etc. Discuss what the results of the survey might have been if we had used weight rather than number of item.

Continue on with the additional activities as desired.

Activity A

How many items of trash do you think your group will find along one mile of roadway at Mingo Refuge? Record your estimate below.

Devise a method for recording the types and amount of litter found. You may want to use the categories of litter used in the KAB survey. Be sure and use a method which will allow you to calculate the percentage. of recyclable items found.

Type of Litter	Number of Items

Activity B

After you have compiled the data from your litter survey, answer the following questions:

1. Assuming that there are 50 miles of roads on the refuge, how many pieces of litter are there all together?

2. How long did it take you to pick up trash from one mile of road? If the refuge has 50 miles of roads that need picked up 5 times a year, and the average salary paid is $5 per hour, how much would it cost the refuge to pick up all the trash each year?

Activity C

1. Calculate the percentage of items you found that could be recycled.

2. Why should items be recycled? List 5 reasons.

3. Take a look at your lunches for today and determine how much waste there is in packaging your food.

4. Poplar Bluff and Cape Girardeau have recycling centers. Would you like to collect recycleable materials during the rest of the summer and take them to the centers?

Activity D

1. Many items of trash last for a long time. Discuss and write below a method for finding out which items last the longest and for how long.

2. Many of the items you found are nonrenewable resources Some are not. List 10 renewable and nonrenewable natural resources on Mingo List 10 renewable and 10 nonrenewable resources used in the Y.C. program.

Survey of Types of Litter[1]

Jefferson J.H.S. Champaign,Ill.

Types	% by weight
Paper material	5.6
Metal cans	39.1
Glass	35.8
Plastic	6.3
Other	13.2

Keep America Beautiful

Types	% by item
Paper material	59
Metal cans	16
Glass	6
Plastic	6
Other	13

[1] McCollum, Dannel, Science and Children, "Litter Study: A School Research Project.", Vol. 13, #7, 1976.

Source Sheet-Solid Waste
Mingo YCC-1976

Mingo Refuge has about 50 miles of roads plus many miles of streams, ditches and trails, and numerous parking areas and picnic sites. All of these areas are subject to a great deal of littering by people who visit the refuge. In addition much litter and debris washes into the refuge during high water.

The cost to the refuge and taxpayers for picking up this litter is considerable. More than 450 man hours are spent each year for trash collection on the refuge. Additional costs such as gas and other vehicle expenses plus paying someone to haul the garbage to a sanitary landfill quickly mount up. All in all the refuge probable spends close to $5,000 on trash and litter removal, and this doesn't include the "hidden" costs of energy loss and resource depletion when trash is not recycled.

Many experts consider the solid waste problem to be on of the worst crises in terms of aesthetics and energy loss that America faces